Claim amendments

Claims 1 – 16 (cancelled)

Claim 17, figures 44, 45 and 46, (new): A **bicycle pedal assembly** comprising:

A) a **pedal** having a length to substantially extend beneath the entire foot of the cyclist, thus supporting the ball and the heel of the foot;

B) a **shoe**

C) a **mechanism** allowing the control of the angle of inclination of the said **pedal** (A) with respect to the ground during a complete pedalling cycle,

the said **pedal** (A) and **shoe** (B) being **CHARACTERIZED** as follows :

-the said **pedal** (A) includes a rigid part (25, fig 44, 46), matching the shape of the shoe (28, fig 45), mounted in a fixed position on the inside of the pedal, the curvature of this rigid part (25, fig 44, 46) being substantially the same as that of the shoe such that the shoe, once positioned on the pedal (21, fig 44, 46), is maintained in a fixed position (the heel of the shoe touching the pedal (21, fig 44, 46)), the rigid part (25, fig 44, 46) being curved upwards at its top extremity , the rigid part (25, fig 44, 46) not covering the outside of the shoe relative to the bicycle (fig 44);

-the said **pedal** (A) includes an axle (26, fig 44, 46), being mounted in a fixed position on the inside of the pedal (21, fig 44, 46) parallel to the pedal surface, said fixed position allowing the insertion of the axle (26, fig 44, 46) approximately in the middle of the heel of the shoe.

-the said **shoe** (B) includes a hole (27, fig 45), the hole opening being enlarged in the shape of a funnel, the hole (27, fig 45) being positioned in a manner that, when the shoe (28, fig 45) is in its final position (fig 44, 46), that is when the axle (26, fig 44, 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the shoe's heel is in contact with the pedal (fig 44, 46).

Claim amendments

Claim 18, figures 88 and 88, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a **pedal axle** (15, fig 87, 88) to be fixed to a bicycle crank arm and to be rotated by the foot of a cyclist in a direction of the crank's rotation; the portion of the pedal (21, fig 87, 88) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1) which allows the movement of the pedal (21, fig 87, 88) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 87, 88) during a complete pedalling cycle (360 degrees),

the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 87 and 88) being **CHARACTERIZED** as follows:

-the **pedal axle** includes a circular part (b, fig 87) rotating freely in a circular hole at the extremity of the crank arm which contains roller cylinders (108 b), the square part of the axle (109) being inserted in the square hole (109) at the front and under the pedal (21), the said square hole having the same dimensions than the square part (109) of the axle, this square hole in the pedal being drilled parallel to the surface of the pedal and is integral with the pedal (21); the grooved part of the axle (109 a) is inserted in the grooved hole of the toothed cam (104 a), the grooved part of the axle and the grooved hole being of the same dimensions, the grooves allowing to choose the angle of inclination of the pedal (21) with respect to the toothed cam (104) and to make the toothed cam(104), the axle (109, a, b) and the pedal (21) being integral with each other as if a single rigid part; a toothed circular wheel (103) is mounted in a fixed position to the crankset casing, this wheel cannot rotate: it is the chain (105) which goes around this wheel (103) when the crankset rotates; a cam (104) (therefore not circular) having the same number of teeth (therefore same circumference) as the toothed circular wheel (103), the cam and the toothed circular wheel being tied together by a traction chain (105) equipped with a spring driven chain tensor (106, 107), the position of the cam (104) relative to the axle (109) is chosen to obtain the desired inclination of the pedal (21) with respect to the ground during a complete rotation (360 degrees) of the crankset.

Claim amendments

Claim 19, figure 86, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 86) to be fixed to a bicycle crank arm and to be rotated by the foot of a cyclist in a direction of the crank's rotation; la portion of the pedal (21, fig 86) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1) which allows the movement of the pedal (21, fig 86) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 86) during a complete pedalling cycle (360 degrees),

the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 86) being **CHARACTERIZED** as follows:

-it includes a rigid part of irregular shape (100), the lower portion of this rigid part (100) being mounted on the inside of the pedal (21) in a fixed position; the upper portion of the rigid part (100) being curved in a manner that:

i)when the upper portion goes back and forth between wheels (102) during a complete rotation of the crankset (360 degrees), we obtain the desired angle of inclination of the pedal (21);

ii)the upper portion of this part (100) which goes back and forth between the wheels (102) has a uniform width in order to continuously touch each of the 2 wheels (102) which press (while turning) against the two borders of the irregular curved rigid upper part (100).

-it includes two wheels (102) mounted on each side of the bike's frame in a plane parallel to the frame, the two wheels being tied together by two rectangular parts (101) located on each side of the two wheels thanks to two axis of rotation (W)(two axis on each side), the rectangular part (101) located between the bike's frame tube and the two wheels (102, fig 86), being mounted by its centre to the bike's frame tube thanks to an axis of rotation (Z), thus allowing the combined part (101 and 102) to rotate around the axis (Z) when the crankset rotates, permitting to keep the contact in a tangent (90 degrees) between the two wheels and the two rims of rigid part (100) on which wheels (102) rotate.

Claim amendments

Claim 20, figures 78 and 79, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 78, 79) to be fixed to a bicycle crank arm and to be rotated by a foot of a cyclist in a direction of the crank's rotation; la portion of the pedal (21, fig 78, 79) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1) that allows the movement of the pedal (21, fig 78, 79) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 78 , 79) during a complete pedalling cycle (360 degrees),

-an axis of rotation (59, fig 79) mounted on a collar installed in a fixed position around the lower horizontal tube of the of the frame supporting the rear wheel of the bicycle;

-a crank (53, fig 78, 79) of the same length as the crankset's crank always moving parallel to the pedal crank , this crank (53, fig 78, 79) rotating freely on the axis of rotation (59, fig 79).

the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 78 and 79) being **CHARACTERIZED** as follows:

-it includes an horizontal part (54) tying together the top extremities of the crank (53) and the crankset's crank; a part (55) having a hole with teeth which are inserted in the axis (60) having similar teeth at the rotating extremity of the crank (53); this part (55) is therefore integral with the crank (53) and the toothed hole (55) allows the choice of the angle between parts (55 and 53), this angle remaining constant during the mechanism's 360 degree rotation; a straight part (57) which can be adjusted to the desired position in the slot (or groove) of part (55) using a small screw which traverses the sliding element (57) and part (55), thus allowing to choose the length of the combined part (55 plus 57); a fixed axis of rotation at the extremity of part (57) which is inserted in the hole of part (56, fig 80); a part (58) which can adjusted to the desired length, in a fashion similar to part (55), in the slot (or groove) of part (56), thus allowing to choose the length of the combined part (56 plus 58); a fixed axis of rotation at the extremity of part (58) which is inserted in a fixed rotation hole located at the rear of the pedal (21).

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Claim 21, figure 81, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 81) to be fixed to a bicycle crank arm and to be rotated by a foot of a cyclist in a direction of the crank's rotation; the portion of the pedal (21, fig 81) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1) that allows the movement of the pedal (21, fig 81) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 81) during a complete pedalling cycle (360 degrees);

-an axis of rotation (65, fig 81) mounted on a collar (64, fig 81) installed in a fixed position around the lower horizontal tube of the of the frame supporting the rear wheel of the bicycle;

-a crank (66, fig 81) of the same length as the crankset's crank always moving parallel to the pedal crank , this crank (66, fig 81) rotating freely on the axis of rotation (65, fig 81).

The said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 81) being **CHARACTERIZED** as follows:

it includes a toothed cam (67), therefore non-circular, which is of the same circumference as that of the circular toothed wheel (62), both having the same number of teeth, the said cam (67) being soldered on the inside extremity of the axle (65), the fixed extremity of the crank (66) being soldered to the outside extremity of axle (65) in such a way that the cam (67), the axle (65) and the crank (66) are integral with each other: when the crank (66) rotates, the cam (67) rotates with the crank (66), the axle (65) which ties them rotating freely at the top of the collar (64); a toothed wheel (62) with its centre coinciding with the axis of rotation of the crankset, and which is integral (soldered to) with the crankset's crank, the wheel (62) rotating with the crankset's crank ; the toothed cam (67) and the toothed wheel (62, fig 81) are put into rotation by a traction chain (63) which ties them together; a rigid rod (68) one extremity of which has a rotation joint (70) located at the rear and on the inside of the pedal(21) and the other extremity having another rotation joint (69) located at the moving extremity of the crank (66).

Claim amendments

Claim 22, figure 84, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 84) to be fixed to a bicycle crank arm and to be rotated by a foot of a cyclist in a direction of the crank's rotation; the portion of the pedal (21, fig 84) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1)that allows the movement of the pedal (21, fig 84) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 84) during a complete pedalling cycle (360 degrees);

-an axis of rotation (88, fig 84) mounted on a collar installed in a fixed position around the lower horizontal tube of the frame supporting the rear wheel of the bicycle;

-a crank (87, fig 84) of the same length as the crankset's crank always moving parallel to the pedal crank, this crank (87, fig 84) rotating freely on the axis of rotation (88, fig 84).

The said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 84) being **CHARACTERIZED** as follows:

it includes a rigid part (89) having an elbow (in the shape of an inverted L), the said rigid part (89) comprised of 3 rotation joints (90, 91 and 92); a crank (85), one extremity of which rotates freely around one rotation joint (86) coinciding with the axis of the bike's rear wheel, but independently of this axis of rotation of the bike's rear wheel (the rotation of the bike's rear wheel having no influence on the crank's (85) free movement), the rotation joint (90) located at the extremity of rigid part (89) is mounted on an axis of rotation located at the moving extremity of the crank (85), the rotation joint (92) located at the other extremity of rigid part (89) is mounted on an axis of rotation located at the rear of the pedal (21) on the inside of the pedal (21), the rotation joint (91) located on the elbow of part (89) is mounted on an axis of rotation located on the moving extremity of the crank (87), the exact triangular position of these 3 rotation joints (90, 91 and 92) on rigid part (89) and the crank's length (85) are chosen in a manner that, when the crank (87) makes a complete 360 degree rotation, the crank (85) does not make a complete rotation but rather goes back and forth with respect to the imaginary vertical line (V).

Claim amendments

Claim 23, figure 85, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 85) to be fixed to a bicycle crank arm and to be rotated by a foot of a cyclist in a direction of the crank's rotation; the portion of the pedal (21, fig 85) which supports the ball of the foot being positioned substantially directly above said pedal axle;

-a **mechanism** (item C claim no 1) that allows the movement of the pedal (21, fig 85) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 85) during a complete pedalling cycle (360 degrees).

the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 85) being **CHARACTERIZED** as follows:

-it includes a part (93) mounted in a fixed position along the lower frame tube supporting the rear wheel, this part (93) having a groove inside which a wheel (94) can rotate while going back and forth along the groove, the said groove being straight; a rigid rod (95), one extremity of this rigid rod (95) bearing a rotation joint mounted on the axis of rotation of the wheel (94), the other extremity of the rigid rod (95) bearing a rotation joint mounted on an axis of rotation (99) located at the rear of the pedal (21) on the inside; another rigid rod (96) one extremity of which bears a rotation joint (97) mounted on an axis of rotation located at the front of part (93) just before the beginning of the groove, the other extremity (mobile) of the rigid rod (96) also bearing a rotation joint (98) mounted on an axis of rotation located in a fixed position on the rigid rod (95) approximately at the centre of the rigid rod (95).

Claim 24, figure 83, (new): A **bicycle pedal assembly** *according to claim 1*, comprising:

-a pedal axle (15, fig 83) to be fixed to a bicycle crank arm and to be rotated by a foot of a cyclist in a direction of the crank's rotation; the portion of the pedal (21, fig 83) which supports the ball of the foot being positioned substantially directly above said pedal axle;

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-a **mechanism** (item C claim no 1) that allows the movement of the pedal (21, fig 83) to be identical to the movement of the underside of a shoe when a pedal which supports only the ball of the foot is used (fig 76), the whole of the shoe's underside being continuously in contact with the pedal (21, fig 83) during a complete pedalling cycle (360 degrees).

the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 83) being **CHARACTERIZED** as follows:

-it includes a collar (83) wrapped around the lower frame tube in a fixed position, this collar (83) supporting the cam (78) (non circular), said cam (non-circular) (78) bearing a groove along its circumference inside which rotates a wheel (82), said cam (78) being mounted in a fixed position on the collar (83), a crank (79) having an axis of rotation at the bottom (80) mounted on the middle part of the cam (78) , this crank having an opening at the top of which a hollow cylinder is soldered; in the inside of this hollow cylinder slides freely a rigid rod (81), the said rigid rod (81) being elbowed at both extremities in opposite direction, the lower elbow of the rigid rod (81) bearing a wheel (82) which rotates in the groove along the cam's circumference (78), the upper elbow of the rigid rod (81) being inserted in an axis of rotation (84) located at the rear and on the inside of the pedal (21).

Claim 25, figures 56, 57, 58, 59 and 60, (new): A **bicycle pedal assembly** *according to claim 1*, the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 56, 57, 58, 59 and 60) being **CHARACTERIZED** as follows:

-a part (39) with a hole, the said part (39) rotating freely in the axis (15) of the extremity of the crankset's crank, the vertical portion of the L-shaped rigid axle (40) being inserted in the hole of the said part (39), and being able to slide back and forth in the hole of the part (39), according to whether the spring (41) is compressed during the extension of the leg or it releases during the flexion of the leg of the 360 degree pedalling cycle; a compression spring (41) inserted along the vertical portion of the L-shaped rigid axle (40), between the intersection of the sides (37, 38) and the part (39).

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Claim 26, figures 72, 73, 74 and 75, (new): A **bicycle pedal assembly** *according to claim 1*, the said **mechanism** (item C claim no 1) of the **bicycle pedal assembly** (fig 72, 73, 74 and 75) being **CHARACTERIZED** as follows:

-It includes an uneven Z-shaped rigid part (fig 74) mounted in a fixed position under the pedal(21); a rectangular base (50), the said rectangular base having 2 vertical rigid rods (s1 and s2) mounted in a fixed position at the front of the rectangular base (50), two other rigid vertical rods (s3 and s4) being mounted in a similar fashion approximately in the middle of the base (50) , and also two more (s5 and s6) again being mounted in a similar fashion at the rear of the rectangular base (50), each of these pairs of rods (s1 + s2, s3 + s4, s5 + s6) bearing at their top extremity a horizontal axis of rotation on which are mounted 2 gear wheels in fixed positions (44 and 47 for s1 + s2, 46 and 48 for s3 + s4, 51 and 52 for s5 + s6), each of these pairs of gear wheels being integral with each other (they rotate together), a traction chain (ch47) tying the gear wheels (47 and 52) together, another traction chain (ch48) tying together the gear wheels (48 and 51), the rear wheel of the bike (symbolized by wheel 49) rotating (*always in the same direction*) when one or the other of the two gear wheels (51 or 52) rotates, the gear wheels (51 and 52) always rotating *in the same direction;* four steel rods (t1, t2, t3 and t4) mounted vertically on the base (50) in a fixed position (in a rectangular position as seen from the top, a rod at each corner of the rectangle); a rigid cubic form (hollow) (42), the said cubic form having 4 rectangular holes (one at the top, one at the bottom, another at the front and the last one at the rear) together with 4 vertical holes on the 4 corners from top to bottom vertically, in these 4 holes are inserted the 4 steel rods (t1, t2, t3 and t4), the rigid cubic form (42) being able to slide freely (up and down) along the four steel rods (t1, t2, t3 and t4), the uneven Z-shaped rigid part (fig 74) going back and forth (up and down) inside the rigid cubic form (42) thanks to the 2 rectangular holes drilled at the top and bottom of the rigid cubic form (42), two springs (r1 and r2) being inserted in the two vertical portions of the uneven Z-shaped part attached under the platform (fig 74),

Claim amendments

these two springs (r1 and r2) being alternatively compressed and released as the uneven Z-shaped part fixed under the platform goes back and forth up and down inside the rigid cubic form (42); a T-shaped part (43) with its vertical portion bearing gear teeth which can be inserted in those of the wheel (44), the horizontal portion of the part (43) being able to slide back and forth in the hole on the front side of the cubic form (42, fig 72) and bears a compression spring (r3) which maintains the vertical portion of rigid T-shaped part (43) pressing against the side of the cubic form (42) when the inclined portion of this part (43) is not in contact with the inclined portion of the uneven Z-shaped part attached under the platform (fig 74); another T-shaped part (45) with its vertical portion bearing gear teeth which can be inserted in those of the wheel (46), the horizontal portion of the part (45) being able to slide back and forth in the hole on the rear side of the rigid cubic form (42) and bears a compression spring (r4) which maintains the vertical portion of the rigid T-shaped part (45) pressing against the side of the cubic form (42) when the inclined portion of this part (45) is not in contact with the inclined portion of the uneven Z-shaped part attached under the platform (fig 74).

END OF CLAIMS